

What is claimed is:

1. A Stirling cycle engine comprising:
  - a casing having cylindrical shape;
  - a cylinder made from metal, said cylinder being coaxially inserted into said casing;
  - a displacer slidably inserted into the inside of said cylinder adjacent to a distal end thereof;
  - a piston slidably inserted into the inside of said cylinder adjacent to a proximal end thereof;
  - a driving mechanism for reciprocating said piston, said driving mechanism being provided around an outer periphery of said cylinder adjacent to the proximal end thereof;
  - a plurality of mounts for fixing said cylinder within said casing and supporting said driving mechanism, said plurality of mounts being provided on an outer periphery of said cylinder between the proximal and the distal ends thereof;
  - a first flat spring having a center portion thereof connected to said piston;
  - and
  - a plurality of connecting arms, one ends thereof being connected to one of said mounts and the other ends thereof being attached to said first flat spring,
  - wherein said cylinder, said plurality of mounts and said plurality of connecting arms are integrally formed with one another.
2. The Stirling cycle engine according to claim 1, wherein said plurality of connecting arms has reinforcing ribs respectively.

3. The Stirling cycle engine according to claim 1, further comprising:  
a plurality of spacers attached to the other ends of said connecting arms respectively;

a rod, one end thereof being connected to said displacer; and

a second flat spring having a center portion thereof connected to the other end of said rod;

wherein peripheral portion of said first flat spring is sandwiched and supported between the other ends of said plurality of connecting arms and one ends of said spacers, while peripheral portion of said second flat spring is attached to the other ends of said spacers.

4. The Stirling cycle engine according to claim 3, wherein either the other ends of said plurality of connecting arms or one ends of said spacers have screws, and the others have internal threads fitting to said screws.

5. The Stirling cycle engine according to claim 2, wherein said cylinder, said plurality of mounts and said plurality of connecting arms integrated one another are made from an aluminum bulk.

6. The Stirling cycle engine according to claim 5, wherein said cylinder, said plurality of mounts and said plurality of connecting arms integrated one another are formed by die casting.

7. A Stirling cycle engine comprising:

a cylinder for slidably inserting a piston and a displacer;

a casing accommodating said cylinder, said casing having a cylindrical portion being communicated with said cylinder, said cylindrical portion allowing said displacer to freely slide therein;

a plurality of mounts for fixing said cylinder within said casing and supporting a driving mechanism, said driving mechanism forcing said piston to reciprocate;

a plurality of flat springs having center portions thereof connected to said piston and said displacer via a connection means; and

a plurality of connecting arms, one ends thereof being fixed to one of said plurality of mounts and the other ends thereof being connected to peripheral portion of said plurality of flat springs, wherein

said cylinder, said plurality of mounts and said plurality of connecting arms are integrally formed with one another.

8. The Stirling cycle engine according to claim 7, wherein:

said plurality of flat springs comprise a first flat spring and a second flat spring;

the other ends of said plurality of connecting arms have spacers respectively, said spacers having one end and the other end and being attachable to the other ends of said plurality of connecting arms;

peripheral portion of said first flat spring are sandwiched and supported between the other ends of said plurality of connecting arms and one ends of said respective spacers; and

peripheral portion of said second flat spring are attached to the other ends

of said spacers.

9. The Stirling cycle engine according to claim 8, wherein:

surfaces of the other ends of said plurality of connecting arms comprise a plane intersecting the axis of said cylinder at right angle; and

said first and second flat springs intersect the axis of said cylinder at right angle in order to absorb a force while equally distributing the force on one surface thereof entirely, the force being generated by reciprocating motions of said piston and said displacer.

10. The Stirling cycle engine according to claim 8, wherein said spacers have hexagonal pillar shapes.

11. A Stirling cycle engine comprising:

a casing having a cylindrical shape;

a cylinder for slidably inserting a displacer and a piston into a part adjacent to one end and another part adjacent to an other end thereof respectively, said cylinder being coaxially placed inside said casing;

a driving mechanism provided around an outer peripheral surface of said cylinder, said driving mechanism forcing said piston to reciprocate inside said cylinder;

a mount for fixing said driving mechanism to the outer peripheral surface of said cylinder, said mount being integrally formed with said cylinder;

a flat spring having a center portion thereof connected to said piston; and

a plurality of connecting arms, one ends thereof being integrally formed

with said mount and the other ends thereof being connected to a peripheral portion of said flat spring.